

**Table S1** Univariate Cox regression analyses of cancer hallmarks in the TCGA-LIHC cohort

ID	coef	HR	HR.95L	HR.95H	P value
Glycolysis	14.56311042	2111925.019	6510.251723	685108268.6	0.000000795
Myc_signaling	13.06964869	474325.3171	3031.616857	74212711.24	0.000000398
PI3K_AKT_mTOR_signaling	10.47043447	35257.53232	20.40122263	60932308.21	0.005908818
DNA_repair	9.800495899	18042.69006	36.89897845	8822430.273	0.001922109
Mitotic_spindle	6.574431528	716.5381765	25.78253335	19913.75135	0.000106322
G2M_checkpoint	4.774652312	118.4691172	17.34419773	809.2003994	0.00000111
Hypoxia	3.381513216	29.41524909	0.600401121	1441.131352	0.088561855
p53_pathway	2.687530496	14.69534087	0.033845274	6380.59673	0.385784131
Notch_signaling	1.609832216	5.001971906	0.198927501	125.7730723	0.327843032
Angiogenesis	0.961798802	2.616398627	0.521088381	13.13700713	0.242715282
Epithelial_mesenchymal_transition	0.895779112	2.44924328	0.459775835	13.0472117	0.293921632
TGF_beta_signaling	0.848399916	2.335906215	0.128288362	42.53275783	0.566630901
TNFa_signaling_via_NFkb	0.479159269	1.614716289	0.188610787	13.8237517	0.661842575
Wnt_beta_catenin_signaling	0.400327847	1.492313868	0.096264006	23.13430295	0.774681017
Complement	0.330638108	1.391856	0.027457493	70.55498852	0.868885973
Inflammatory_response	0.05932626	1.061121386	0.099132334	11.35833845	0.960880077
IL6_JAK_STAT3_signaling	-0.144176523	0.865734912	0.075937576	9.869908653	0.907562855
Hedgehog_signaling	-0.305136069	0.737023081	0.031339685	17.33275303	0.849784069
Cholesterol_homeostasis	-0.856924369	0.424465576	0.011337978	15.89093075	0.642920561
Apoptosis	-0.960779035	0.382594715	0.005485307	26.68560181	0.657322735
Interferon_alpha_response	-1.194367922	0.302895347	0.031824191	2.882888403	0.298828636
Interferon_gamma_response	-1.628933764	0.196138593	0.015976638	2.407912527	0.202967516
Xenobiotic_metabolism	-2.784858238	0.06173784	0.008651285	0.440577431	0.005478665
Bile_acid_metabolism	-2.853179424	0.057660701	0.011981762	0.27748478	0.000372032
Kras_signaling	-3.862520463	0.021014965	0.0000812	5.437462992	0.17300731
Fatty_acid_metabolism	-4.293997249	0.013650253	0.000713899	0.261002529	0.004342296
Heme_metabolism	-5.668688687	0.003452389	0.00000288	4.140724984	0.117078897
Adipogenesis	-6.82557265	0.001085654	0.000005	0.235693253	0.012903084
Oxidative_phosphorylation	-8.98689547	0.000125038	0.000000168	0.093199724	0.007740512

HR, hazard ratio.